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Di2

DIGITAL INTEGRATED INTELLIGENCE
Component Selection for 11-Speed Systems

INTRODUCTION

Dura-Ace Di2 9070 is third generation Di2, and the first E-tube 11-speed electronic drivetrain system. In this download module you will learn to select the proper components and wiring. The overall component selection process, installation and e-tube functionality is quite similar to second generation Di2 6770. But there are some important differences. Four of the major differences are:

1. Addition of 11th rear sprocket (Drivetrain not compatible with 10-speed)
2. Addition of SM-BTR2 Seat Post Battery Option; a smaller, lighter battery that installs in seat post
3. Addition of several shifter and switch options, with emphasis on Triathlon and Time Trials
4. Two Junction A Options: SM-EW90-A: 3-Port Junction, and SM-EW90-B: 5-Port Junction (S-Port required for SM-BTR2)

Obviously 9070 adds the eleventh gear. The new BTR2 Seat Post Battery places the smaller, lighter battery inside the seat post, giving you the option for an internal or external battery. The new system also adds and accommodates a wider range of shifter options for standard road builds, plus multiple switches for Tri- and Time Trials systems. Instead of the single Junction A connection of earlier Ultegra 6770, the added features require two A Junction options: SM-EW90-A Junction A is a 3-Port connector used mostly for basic drop handlebar set-ups. SM-EW90-B Junction A is a 5-Port connector that accommodates multiple switches for time trials and triathlon systems. Note that the earlier SM-EW67AE Junction A box is also compatible with 9070 system, but can't be used with the SM-BTR2 internal battery.

NOTE ON ORDERING COMPONENTS

Like all bike builds, it is very important to carefully analyze your customer's needs and detailed specifications before ordering parts. Many components, like dual control levers and derailleurs are obvious. But the 9070 11-Speed system offers several options that are new. For example, You'll need to determine whether you are dealing with an internal or external build; whether you're going to use the internal or external battery; And perhaps most important whether your customer wants a basic drop handlebar build or a bike built for Tri- or Time Trial racing. You'll also have to pay attention to the finer specs for parts like band adapters, bottle cage adapters and frame grommets that are either external- or internal-specific, or depend on specific tube diameters. The point is: pay attention to details. And note that all parts are ordered separately.

When building any Di2 bike always refer to the Dealer Manual and/or component Service Instructions. They can be found at:

techdocs.shimano.com or si.shimano.com

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OBJECTIVES

Upon Completion of this module, you will:

1. ***Know*** the components that are required for Di2 11-Speed drop handlebar Road builds.

2. ***Know*** the components required for Tri- and Time Trial builds.

3. ***Know*** Di2 Shifter/Switches options.

4. ***Know*** the Junction A 3-Port and 5-Port options and when to use each.

5. ***Know*** how to select the appropriate EW-50 Wires for each build.

6. ***Know*** the component compatibility of different Di2 Systems.

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COMPONENTS REQUIRED FOR BASIC DROP HANDLEBAR ROAD BUILD

ST-9070 Dual-Control Levers
FD-9070 Front Derailleur
SM-AD67, 79, 90 Optional Band Adapter for (39.9mm, 31.8mm, 28.6mm)
RD-9070 Rear Derailleur

JUNCTION A OPTIONS

SM-EW90-A 3-Port Junction A for Connection btwn Front Shifters and Junction B
or
SM-EW90-B 5-Port Junction A for use with additional switches
SM-EW67A-E 1-Port Junction A with hard wired 375mm wires to ST.

JUNCTION B OPTIONS

Junction Box B (Connects to Junction A and all other downtube Components)
SM-JC40 for external routing
or
SM-JC41 for internal routing

BATTERY AND BATTERY MOUNT OPTIONS (Lithium Ion)

SM-BTR1 Battery
SM-BMR1-L Battery Mount Long External
SM-BMR1-I Battery Mount Long Internal
SM-BMR1-S Battery Mount Short for External or Internal
3 options with firmware v.2 or later
SM-BCR1 Battery Charger for the BMR1
SM-BCC1 Power Cable for Battery Charger (for SM-BCR1 ONLY)
or
SM-BTR2 Battery (Seat Post Built-In l Either PRO Seatpost or compatible)
SM-BCR2 Battery Charger for Built-in Seat Post Battery (BMR2).
(Attaches to the SM-EW90 A Junction, and also works as connector to E-Tube Project.)
SM-BMR2

WIRE OPTIONS & ACCESSORIES

EW-SD50 Wires required for Junction A to Bar Shifters l Junction B l RD l FD l Battery
Built-In Batt: 6 EW-SD50 Wires Required (Incl. 2x from Junction A to Shifters)
External: 6 EW-SD50 Wires Required (Incl. 2x from Junction A to Shifters)
Internal: 6 EW-SD50 Wires Required (Incl. 2x from Junction A to Shifters)

SM-EWC2 Electric Wire Covers (Required for External Routing only. Black or White)
SM-GM01/GM02 Frame Grommets (Internal Routing only. 2 Sizes: 6mm or 7x8mm.)

MISCELLANEOUS

SM-BA01 Bottle Cage Mount Adapter (Makes sure bottle does not interfere with battery)
TL-EW02 Tool for installing SD50 wires **You need this!**

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COMPONENTS REQUIRED FOR BASIC DROP HANDLEBAR ROAD BUILD

ST-9070 Dual Control Levers
Electronic Switch Operation
Reach Adjust
Programmable

RD-9070 Rear Derailleur
Programmed motion
Saver (fuse) function

FD-9070 Front Derailleur
Programmed trim function
Always aligned and quiet
Support bolt fixes position under torque

SM-AD90 Seat Tube Adapter
(May also use SM-AD79 or SM-AD67)

CHOOSING COMPONENTS FOR TRI- AND TIME TRIAL BUILD: SHIFTER/SWITCH OPTIONS

11-Speed 9070 boasts more versatile shifter options for standard road builds, plus several new shifter and switch options for Tri- and Time Trials systems. Below is a complete list of Di2 shifter options. Before making your component selection for a Tri- or Time Trial build, study your customer's riding needs and all component options.

ST-9071 Dual Control	Time Trial and Triathlon
SW-9071 Remote Satellite Switch	Time Trial (1-Button)
SW-R671 Remote Satellite Switch	Time Trial or Triathlon (2-Button)
SW-610 Sprinter Switch	Time Trial or Triathlon (Only compatible with ST-9070)
SW-R600 Climber Shifter	Racing with ascents

ST-9071 Dual Control Levers
Execute shifts at brake lever

SW-9071 Remote Satellite (One Button)
SW-R671 Remote Satellite (Two Button)

SW-610 Remote Sprinter Switch
Right and left switches
Quick rear shifting in drops
Place anywhere on handlebar
(ST-9070 only)

SW-R600 Climber Switch
One switch only
Place anywhere on bar
Quick rear shiftin on ascent

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CHOOSING A 3- OR 5-PORT JUNCTION A SM-EW90-A (3- Port) or SM-EW90-B (5-Port Junction A)

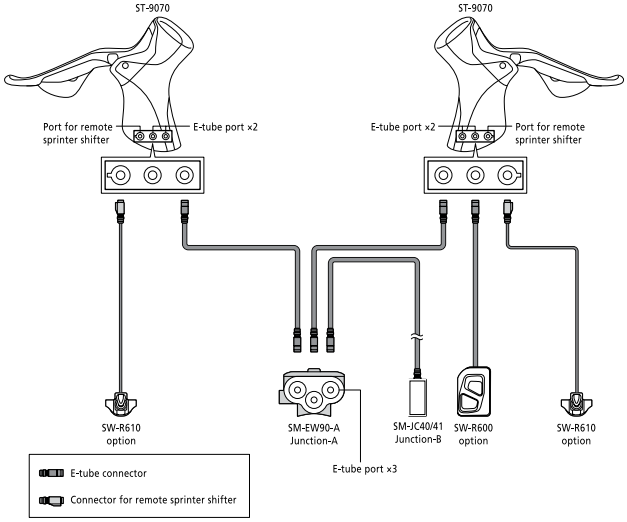
Once you have determined rider's needs and core components, you must select either the 3-Port or 5-Port Junction A. Junction A connects to the shift levers at the cockpit and to Junction B at the bottom bracket area. Below is a diagram that shows the connections and functions that can be made with each option. Familiarize yourself with the two set-ups: Note that the 3-Port is used most commonly with standard Road build and 5-Port is used (and often required) for most Tri- and Time Trial builds.

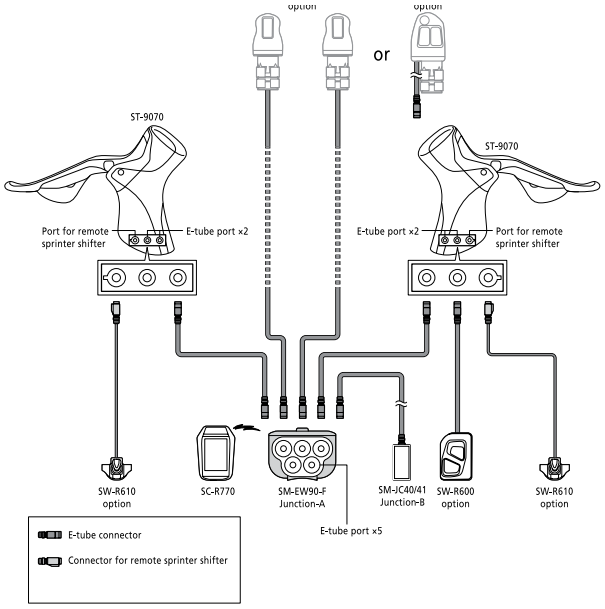
NOTE: *The SM-EW67 Junction A from 10-speed Ultegra Di2 is also compatible with the newer 11-speed systems, but can't be used with internal BTR2 (No charging port). Also note the location of the E-tube ports both inside the shifters and on both Junction A options.*

DURA-ACE 9070 COCKPIT WIRING OPTIONS

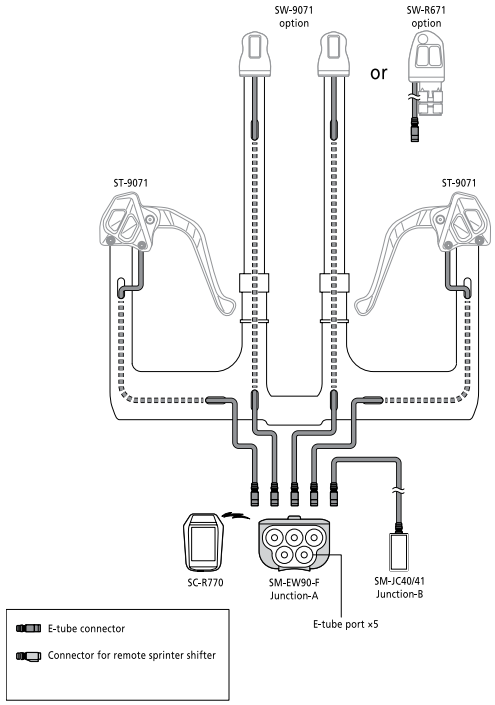
SM-EW90-A 3-Port or
SM-EW90-B 5-Port Junction-A tucks in neatly under stem for a seamless appearance

Drop Handlebar - 3-Port Junction-A
Dura-Ace 9070 cockpit area is customizable based on how many shifting switches are required. The basic drop handlebar set-up uses the SM-EW90-A 3-Port Junction-A and allows the use of SW-R610 sprinter switches - or - SW-R600 climber shifter. (ST-9070 only)





Drop Handlebar - 5-Port Junction-A For the use of multiple shifter switches, the SM-EW90-B 5-Port Junction-A is required.



TT/Tri - 5-Port Junction-A For TT/Triathlon, the SM-EW90 5-Port Junction-A is required to connect either SW-9071 single button switch, SW-R671 double button switch, or both.

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CHOOSING JUNCTION B: SM-JC40 (External) or SM-JC41 (Internal)

Junction B connects to Junction A, then to each of the other key components: FD, RD and Battery.

SM-JC40 Junction B (External)
Used for frames with external wire routing. Connects between Junction A and all other core components

SM-JC41 Junction B (Internal)
Used for frames with internal wire routing. Connects between Junction A and all other core components

CHOOSING BATTERY AND BATTERY MOUNT OPTIONS (Lithium Ion): Internal or External

There are two battery options. The SM-BMR2 is the newer, lighter battery that installs inside the seatpost and does not require a battery mount. The earlier SM-BMR1 is an external battery, and requires one of three battery mounts, depending on whether wiring is internally or externally routed. NOTE: The SM-BCR2 is a new charger for the seatpost battery and is also used as connector to E-tube Project.

SM-BTR2 Seatpost Battery
Built-in type battery
Installs inside seatpost
50 grams

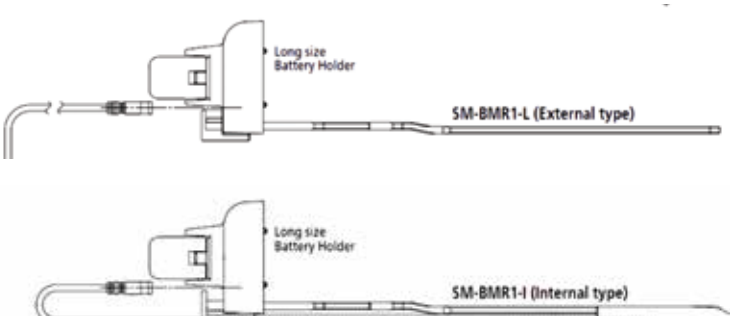
SM-BCR2 Battery Charger
Charger for the built-in type battery.
Also used as port to E-Tube Project

SM-BTR1 External Battery
Original battery for external mount: requires battery mount.

SM-BCR1 Battery Charger
Charger for original externally mounted battery. (Power chord required)

BATTERY MOUNTS

If you're using the SM-BTR1 External Battery then you will need to choose one of three mounts to secure the battery to the frame: 1) Long Mount for external wire routing, 2) Long Mount for internal wiring, and 3) Short Mount which can be used with internal and external wiring.



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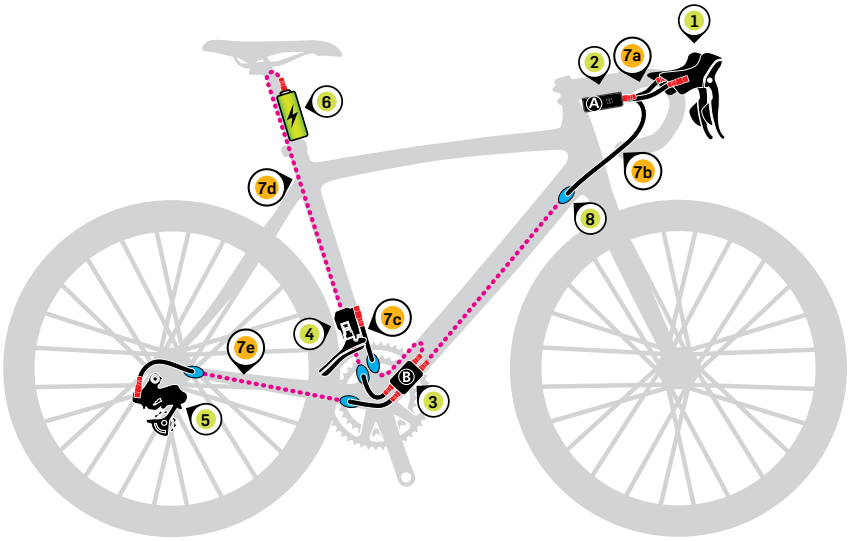
CHOOSING THE CORRECT EW-SD50 WIRE COMBINATIONS

Once you've decided on the type of build and selected your shifter(s), switches, battery-type, etc, you can proceed to measure and select the correct EW-SD50 wire combinations. There are basically three wiring options, which are described below: Internal wiring with a built-in battery, Internal wiring with an external battery, and an external wiring option. You will need a total of six wires: two from Junction A to each shifter. One from Junction A to Junction B. And one each from Junction B to the FD, RD and Battery. To select the correct wires you must first measure the distance between each connection.

For help see: STEC Module "Di2 Installation/EW-SD50/Wire Selection"

DURA-ACE 9070 DI2 SERIES WIRING OPTIONS

EW-SD50 E-Tube wires allow unlimited internal or external wiring options. Determine wire lengths needed and to be safe, use the next length up to eliminate the possibility of stretching wires during final installation.



INTERNAL WIRING

BUILT-IN BATTERY MOUNT TYPE

DETERMINE WIRE LENGTHS BY TAKING THE FOLLOWING MEASUREMENTS:

7a: Junction-A to Shifters
7b: Juntion-A to Junction-B location
7c: Junction-B to Front Derailleur
7d: Junction-B to Battery location
7e: Junction-B to Rear Derailleur

	PART	DESCRIPTION	
1	ST-9070	SHIFT LEVERS (ROAD OR TT/TRI)	
2	SM-EW90	JUNCTION-A (3-PORT OR 5-PORT)	
3	SM-JC41	INTERNAL JUNCTION-B	
4	FD-9070	FRONT DERAILLEUR	
5	RD-9070	REAR DERAILLEUR	
6	SM-BTR2	INTERNAL BATTERY	
7a	EW-ED50	E-TUBE WIRE	JUNC-A TO ST (2X)
7b	EW-ED50	E-TUBE WIRE	JUNC-A TO JUNC-B
7c	EW-ED50	E-TUBE WIRE	JUNC-B TO FD
7d	EW-ED50	E-TUBE WIRE	JUNC-B TO BT
7e	EW-ED50	E-TUBE WIRE	JUNC-B TO RD
8	SM-GM01/2	FRAME GROMMET (5X)	

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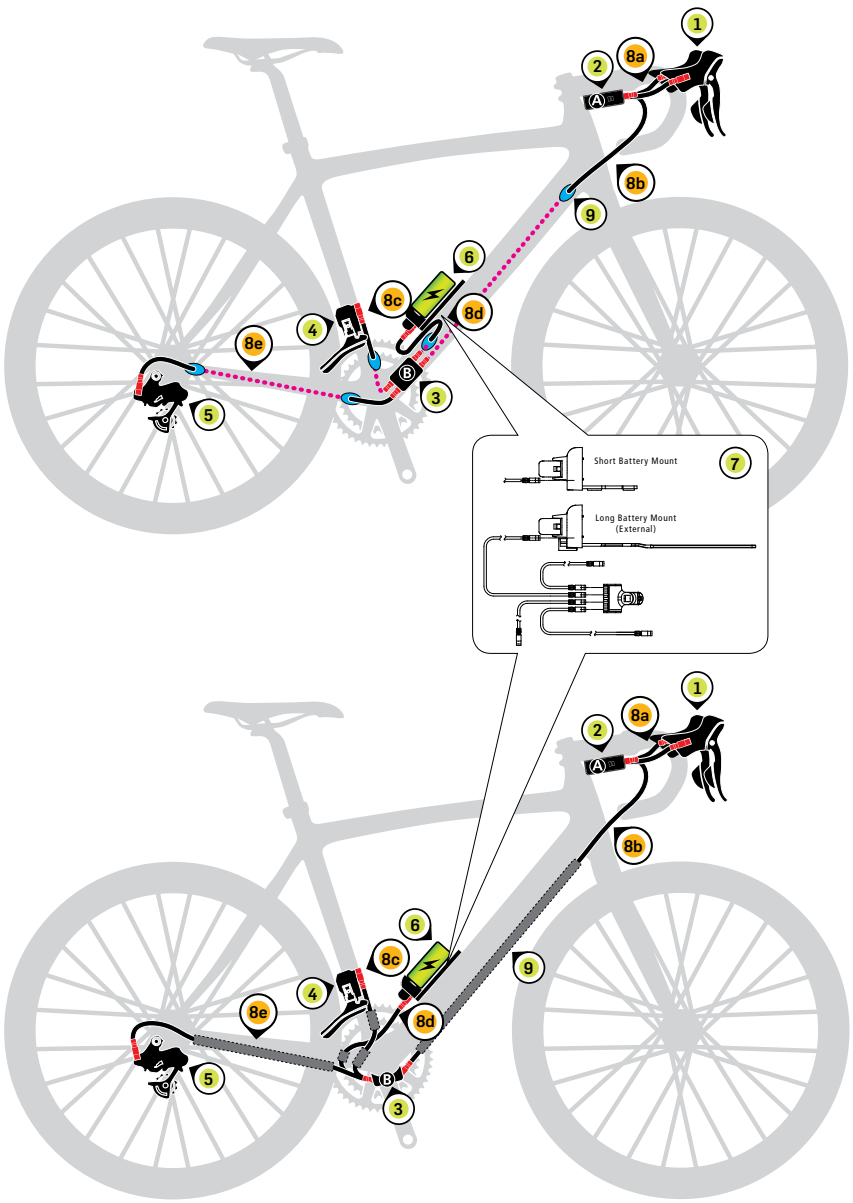
DURA-ACE 9070 DI2 SERIES WIRING OPTIONS Cont



INTERNAL WIRING

EXTERNAL BATTERY MOUNT TYPE
DETERMINE WIRE LENGTHS BY TAKING THE FOLLOWING MEASUREMENTS:
8a: Junction-A to Shifters
8b: Juntion-A to Junction-B location
8c: Junction-B to Front Derailleur
8d: Junction-B to Battery location
8e: Junction-B to Rear Derailleur

	PART	DESCRIPTION	
1	ST-9070	SHIFT LEVERS (ROAD OR TT/TRI)	
2	SM-EW90	JUNCTION-A (3-PORT OR 5-PORT)	
3	SM-JC41	INTERNAL JUNCTION-B	
4	FD-9070	FRONT DERAILLEUR	
5	RD-9070	REAR DERAILLEUR	
6	SM-BTR1	EXTERNAL BATTERY	
7	SM-BM01	BATTERY MOUNT	
8a	EW-ED50	E-TUBE WIRE	JUNC-A TO ST (2X)
8b	EW-ED50	E-TUBE WIRE	JUNC-A TO JUNC-B
8c	EW-ED50	E-TUBE WIRE	JUNC-B TO FD
8d	EW-ED50	E-TUBE WIRE	JUNC-B TO BT
8e	EW-ED50	E-TUBE WIRE	JUNC-B TO RD
9	SM-GM01/2	FRAME GROMMET (5X)	

EXTERNAL WIRING

DETERMINE WIRE LENGTHS BY TAKING THE FOLLOWING MEASUREMENTS:
8a: Junction-A to Shifters
8b: Juntion-A to Junction-B location
8c: Junction-B to Front Derailleur
8d: Junction-B to Battery location
8e: Junction-B to Rear Derailleur

	PART	DESCRIPTION	
1	ST-9070	SHIFT LEVERS (ROAD OR TT/TRI)	
2	SM-EW90	JUNCTION-A (3-PORT OR 5-PORT)	
3	SM-JC40	EXTERNAL JUNCTION-B	
4	FD-9070	FRONT DERAILLEUR	
5	RD-9070	REAR DERAILLEUR	
6	SM-BTR1	EXTERNAL BATTERY	
7	SM-BM01	SHORT OR LONG BATTERY MOUNT	
8a	EW-ED50	E-TUBE WIRE	JUNC-A TO ST (2X)
8b	EW-ED50	E-TUBE WIRE	JUNC-A TO JUNC-B
8c	EW-ED50	E-TUBE WIRE	JUNC-B TO FD
8d	EW-ED50	E-TUBE WIRE	JUNC-B TO BT
8e	EW-ED50	E-TUBE WIRE	JUNC-B TO RD
9	SM-EWC2	WIRE COVERS	

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The EW-SD50 E-Tube Wire options come in fourteen different lengths, from 250mm to 1400mm. Each wire is waterproof and can be used externally or internally. Note that you'll need SM-EWC2 Wire Covers for external routing. And the SM-GM01/ GM02 Frame Grommets are needed for internal routing.

SELECTING EW-SD50 WIRE COMBINATION

Select Junction A: 3-Port or 5-Port
Select Junction B: Internal or External
Select Battery: External or Internal (seatpost)
Select Battery Mount: External Only
Select SIX Wire Lengths: Make your measurement for each segment:

MEASUREMENTS

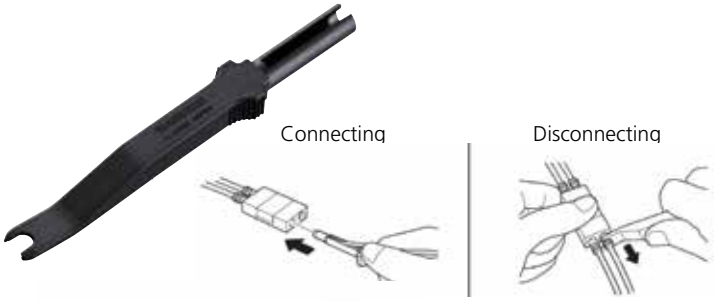
Below are the measurements you'll need to make

1) From Junction A to right and left shifters	(2 Wires)
2) From Junction A to Junction B	(1 Wire)
3) From Junction B to Front Derailleur	(1 Wire)
4) From Junction B to Rear Derailleur	(1 Wire)
5) From Junction B to Battery	(1 Wire)

Calculating Correct Wire Length

Add 50mm to your measurement for extra slack. Then select the wire length that is just above the sum that you get.

MISCELLANEOUS (but important) ITEMS



TL-EW02 TOOL

The TL-EW02 is an important tool. Good connections are key to proper Di2 functions. The tool not only helps youmake sure the wires are connected properly, but it also helps you properly disconnect the wires. Pulling wires out by hand can degrade or damage the wire or connector. So use the tool.

SM-BA01 Bottle Cage Mount Adapter

The bottle cage adapter makes it possible to raise or lower the age for installation and removal of the external battery.

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